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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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EXAMINER

UMEZ ERONINI, LYNETTE T

| | |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
|----------|--------------|

1765

DATE MAILED: 09/11/2002

10

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

| | | |
|-------------------------|----------|---------------|
| Application No. | 1 | Applicant(s) |
| 09/749,191 | | SAHOTA ET AL. |
| Examiner | Art Unit | |
| Lynette T. Umez-Eronini | 1765 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on _____.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 56-61 and 63-73 is/are pending in the application.
- 4a) Of the above claim(s) 56 and 57 is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 58-61 and 63-73 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
- 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) Interview Summary (PTO-413) Paper No(s) _____.
- 5) Notice of Informal Patent Application (PTO-152)
- 6) Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 58 is rejected under 35 U.S.C. 102(b) as being anticipated by Uzoh et al. (US 5,807,165).

Uzoh teaches a method of planarizing a semiconductor wafer that has a SiO₂ insulator layer **16**, a Cu layer **SL** and a Ta metal line layer **LL** (column 1, lines 33-42; column 5, lines 33-37; and Figure 6). The method includes using a CMP apparatus **60**, which includes a rotatable polishing platen **62** attached to a rotatable shaft **68**, a polishing pad **64** mounted to the platen **62**, a means for urging carrier **66** against the pad **64**, and a polishing slurry supply system in fluid communication with the pad **64**. The supply system includes a container **70** coupled to a conduit **72** arranged and dimensioned for dispensing polishing slurry **74** onto the pad **64** (column 5, lines 41-54 and Figures 7-10). The polishing slurry containing silica abrasive, water (DI water), 7% concentration of benzotriazole (same as applicant's copper passivation agent) and a nonionic surfactant such as Alkanol (which is the trade mark for a series of fatty alcohol-ethylene oxide condensation products and is the same applicant's polyethylene oxide surfactant), (column 4, lines 56-62). The aforementioned reads on a chemical-mechanical polishing (cmp) method comprising incorporating into said polishing slurry,

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an organic additive (Alkanol). Since Uzoh uses the same organic additive in the same polishing composition and same method of polishing a metallization structures as those of the claimed invention, then using Uzoh polishing method and composition reads on, in incorporating an organic additive into said polishing slurry, which would inherently result in a final portion of said total polishing period of time less than or equal to 10% of said total polishing period of time.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 59-61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uzoh ('165) as applied to claim 58 above.

Uzoh differs in failing to teach the slurry containing 1.54 wt% 1,2,4-triazole; 0.5 wt% PEG-10,000; 93.6 wt% silica suspension containing 13.6 wt% SiO₂; and 4.33 wt% DI water, in claim 61.

However, Uzoh teaches benzotriazole having a concentration of 200 ppm to 7%, and Alkanol (same as applicant PEG 10,000) in combination with water and silica (column 4, lines 56-61), which suggests that the concentration of the components of the slurry are variable.

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Hence, it is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Uzoh by employing any of a variety of operational variables such as the concentrations of the polishing slurry, including the concentrations as claimed by the applicant. Concentration is a known variable in the polishing art and known to affect both the rate and quality of the polishing process. Hence, conducting routine experimentation for the purpose of reducing damage to the workpiece would optimize the selection of particular values for these variables. Changes in temperature, concentrations, or other process conditions of an old process do not impart patentability unless the recited ranges are critical, i.e., they produce a new and unexpected result. *In re Aller et al.*, 105 USPQ 233.

5. Claims 63, 65, 66, 67, 68 and 70, and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uzoh ('165) in view of Murphy et al. (US 5,478,435).

Uzoh differs in failing to teach decreasing the flow of said polishing slurry prior to the step of removing wafer from against the platen and flowing a polishing additive solution onto the platen for a second period of time while inducing relative motion between said wafer and said platen and maintaining a force between said platen and said wafer; and following said step of decreasing said flow of said polishing slurry and prior to said step of removing said wafer from against said platen, flowing a polishing additive solution onto said platen, **in claim 63.**

Murphy teaches a method of dispensing a liquid slurry in polishing a surface. The method comprises a point of use slurry dispensing system with controls for dilution,

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temperature, and chemical infusion (column 3, lines 4-6). In one embodiment, liquid slurry **14** is introduced into container **21** and dispensed onto a platen **12** (or pad **13**) by pump **22** that is utilized for controlling the flow rate of the slurry (column 4, lines 10-15). Another container **26** and pump **27** function respectively and equivalently as units **21** and **22** to provide a duplicate dispensing system for dispensing another liquid onto platen **12** (column 4, lines 48-52). The dispensing system **20** of FIG. 1 is flexible in that each of the liquid dispensing line is independent of the other. Thus, liquid flow rates and temperature of the each liquid can be set at different levels and controlled separately. Additionally, if desired, other agents (such as oxidizers, etchants and/or chemical additives) can be introduced and combined with the liquids in container **21** and/or container **26** (column 5, lines 5-12). Since Murphy uses the same method of dispensing a polishing slurry and additive in planarizing a wafer as that of the claimed invention then using Murphy's method of planarizing a wafer by point of use mixing a polishing additive with a polishing slurry reads on, decreasing the flow rate of the polishing slurry prior to removing the wafer from the platen; and following said step of decreasing the flow rate of the polishing slurry and the flow rate of the polishing slurry, flowing a polishing additive solution onto said platen and would inherently result in flowing a polishing additive solution onto said platen for a second period of time while inducing relative motion between said wafer and said platen and maintaining a force between said platen and said wafer.

It is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Uzoh by using

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Murphy's point of use mixing in decreasing the flow of the polishing slurry prior to removing the wafer from against the platen; and following said step of decreasing the flow rate of the polishing slurry, flowing a polishing additive solution onto said platen for the purpose of providing substantial cost and time reduction in the use of slurries, as well as allowing for improved controls over the use of the slurry (Murphy, column 6, lines 21-24).

6. Claims 64, 69, 71 and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uzoh ('165) in view of Murphy ('435) as applied to claim 63 above.

Uzoh in view of Murphy differs in failing to teach the concentrations of the polishing additive comprises 2.0-3.0 wt% 1,2,4-triazole; 0.1 – 2.0 wt% PEG-10,000; and DI water, **in claims 69 and 73**; and 0.5 –2.0 psi down force of 5-30 second in a post-CMP buff step, **in claim 73**, and decreasing the flow rate of polishing slurry to zero, **in claims 64 and 71**.

However, Uzoh teaches benzotriazole having a concentration of 200 ppm to 7%, and Alkanol (same as applicant PEG 10,000) in combination with water and silica (column 4, lines 56-61), which suggests that the concentration of the components of the slurry are variable.

Hence, it is the examiner's position that it would have been obvious to one having ordinary skill in the art at the time of the claimed invention to modify Uzoh in view of Murphy by employing any of a variety of operational variables such as the concentration and flow rate of the polishing slurry and the pressure and time used in a

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post-CMP buff step, and the operational variables as claimed by the applicant. Concentration, pressure, and processing time are known variable in the polishing art and known to affect both the rate and quality of the polishing process. Hence, conducting routine experimentation for the purpose of reducing damage to the workpiece would optimize the selection of particular values for these variables. Changes in temperature, concentrations, or other process conditions of an old process do not impart patentability unless the recited ranges are critical, i.e., they produce a new and unexpected result. *In re Aller et al.*, 105 USPQ 233.

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lynette T. Umez-Eronini whose telephone number is 703-306-9074. The examiner is normally unavailable on the First Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703-308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703-972-9310 for regular communications and 703-972-9311 for After Final communications.

Itue
September 7, 2002

Ben L. Utech
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